



Iowa Trauma Registry Report 2016



Iowa Department of Public Health
Protecting and Improving the Health of Iowans

Executive Summary

- 2,093 Iowa resident trauma deaths
 - 75% unintentional, 21% suicide
- 22,103 hospital admissions with a trauma injury present
 - 18,355 unique patients
 - Data retrieved from IHA Inpatient Database
- 14,385 hospital admissions with a trauma injury as the admitting/principal diagnosis
 - 12,507 unique patients
 - Data retrieved from IHA Inpatient Database
- 114 of 118 hospitals reporting to trauma registry
 - Data retrieved from Iowa Trauma Registry
 - All level I, II and III facilities are reporting, as well as 97% of level IV facilities
 - 17,908 incidents
 - 16,252 unique patients
 - 211/283 incidents of physical abuse investigated
 - 6.5% of incidents were work-related
 - 2.6% of incidents were farm-related
 - 22.6% of incidents were motor vehicle crashes
 - 4,078 trauma alerts
 - 1,298 level 1
 - 2,780 level 2
 - 574 self-inflicted injuries
 - 1,736 assault injuries
 - 56.6% male, 42.9% female, 0.5% unknown
 - 1,561 incidents of transfer delay
- 292,558 EMS Incident Reports (an incident report occurs each time an EMS program is notified to respond)
 - 230,458 EMS transport incident reports
 - 62,407 trauma-related incident reports
 - 39,329 trauma-related transport incident reports

Overview

In 1995, the state legislature established the Iowa Trauma Care System Development Act. The Act designated the Iowa Department of Public Health (IDPH) as the lead agency for system development and implementation and established the Trauma System Advisory Council (TSAC) to advise the department and to evaluate system effectiveness. The legislation also established the State Trauma Registry for statewide injury-reporting as a reportable condition. On January 1, 2001, the Iowa Trauma System became fully operational. Hospitals in Iowa were reviewed, verified and categorized and had at least one physician with Advanced Trauma Life Support (ATLS) training. The committee structure for oversight and evaluation was established, and the State Trauma Registry was in place. The all-inclusive system required the participation of Iowa hospitals, transporting ambulance services and rehabilitation centers.

In 2015, the American College of Surgeons-Committee on Trauma (ACS) completed a trauma system consultation visit to assess Iowa's trauma system. The ACS review team made multiple recommendations for improvement including improving the use of data to drive and document changes in the trauma system. The full ACS Trauma System Consultation Report is available at: <https://idph.iowa.gov/Portals/1/userfiles/61/Iowa%20TSC%20Report%20Final.pdf>. Significant progress has been made in meeting the data and other recommendations identified by ACS.

The continuing goal of the trauma system is to provide timely, specialized care by matching trauma patient needs to appropriate resources, from the time of injury through rehabilitation. This requires cooperation of trauma care providers and resources throughout the state along each phase of trauma care. A systems approach recognizes this continuum of care and has been shown to reduce overall costs, disability and death associated with traumatic injury. To accelerate the progress in reducing injuries, the three injury control components of prevention, acute care and rehabilitation must work together.

State Trauma Registry

Iowa Administrative Code 641 Chapter 136 (IAC 641-136) established the State Trauma Registry in 1996. Trauma was identified as a reportable condition. A "trauma patient" is defined as a victim of an external cause of injury that results in major or minor tissue damage or destruction caused by intentional or unintentional exposure to thermal, mechanical, electrical or chemical energy, or by the absence of heat or oxygen (see attached Data Sources document for ICD-10 codes). Chapter 136-Trauma Registry was updated in June 2017. The registry collects and analyzes reportable patient data on the incidence, severity and causes of trauma. The Iowa Trauma Patient Data Dictionary (January 2017) specifies the inclusion criteria and reportable patient data to be reported to the trauma registry or reported to a trauma care facility.

The use of the data includes an annual report of the magnitude of injuries in Iowa, the organization of trauma care, the performance of care and outcomes. The Trauma System Advisory Council's System Evaluation and Quality Improvement Subcommittee routinely review

the data for system improvement recommendations. The data is used by hospitals to drive performance improvement activities. Aggregate data from the registry is used by the trauma service areas to help inform overall improvements to the trauma system. The data has been used for the Burden of Injury Report and injury prevention and control research.

Trauma Hospitals

Iowa has an inclusive trauma system. All 118 hospitals in Iowa are verified as a trauma care facility at some level. There are four levels of trauma care facilities in Iowa. Level I facilities have the resources necessary to provide trauma care to patients with significant traumatic injuries and conduct trauma research. Level II facilities have similar resources for care of the trauma patient but do not actively conduct research activities. Level III facilities have surgical capabilities 24/7/365 including orthopedic surgery but may not have the resources needed to provide definitive care for the most significantly injured trauma patients. Level IV facilities have the resources and training needed to stabilize traumatically-injured patients and provide definitive care for those with minor injuries. The following map show the location and level of all Iowa trauma care facilities.

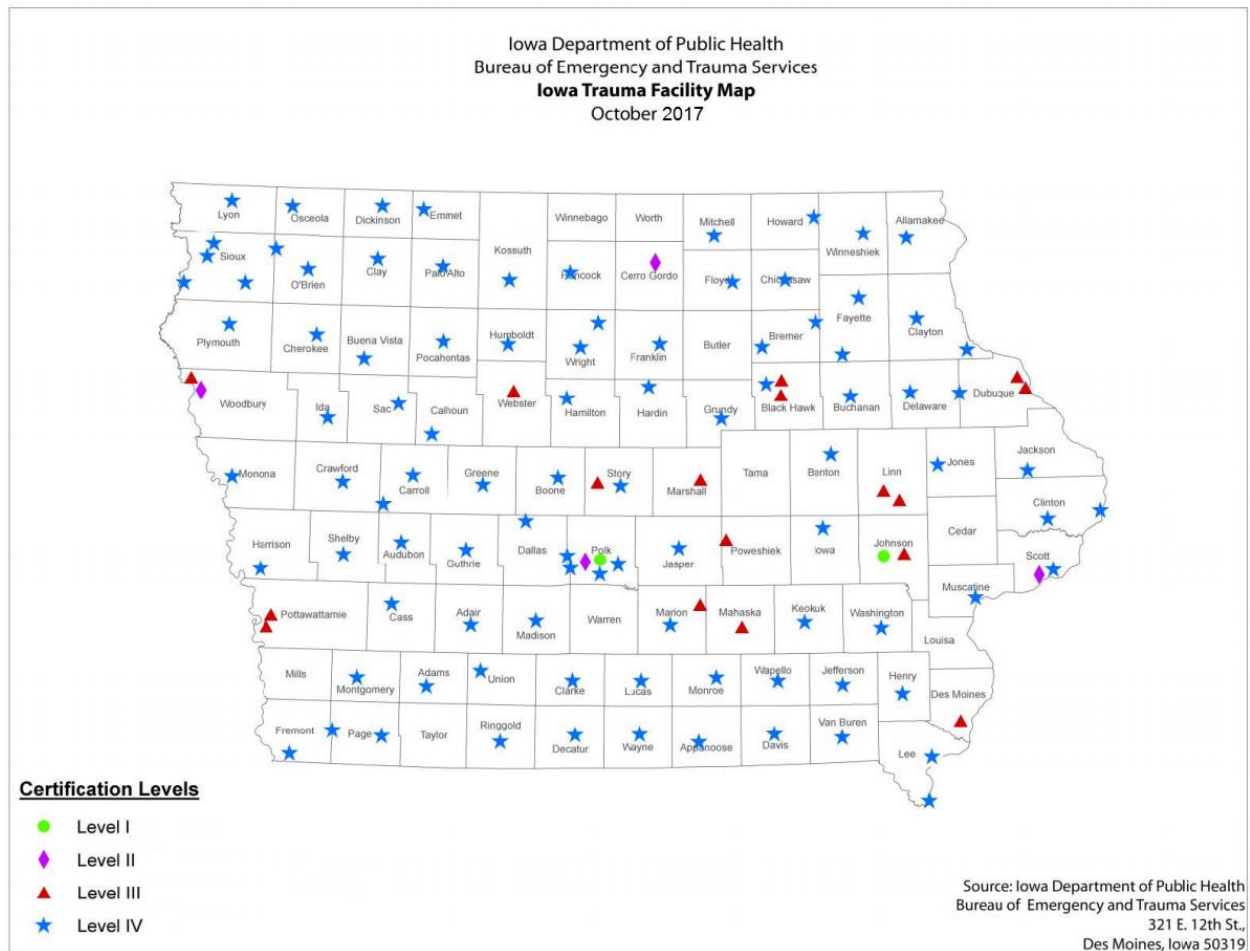


Figure 1: Locations of the trauma system care facilities by level of hospital capability in 2016.

Trauma Facility Level Count

Source: Iowa Department of Public Health | October 2017

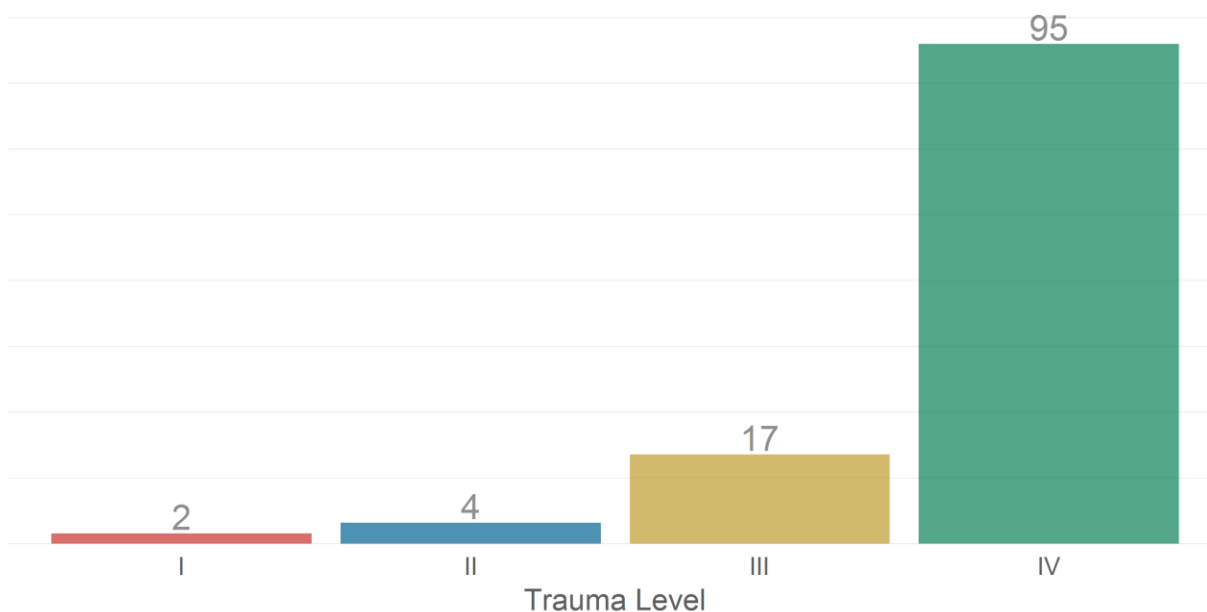


Figure 2: In 2016 one hospital transitioned from a Level III facility to a Level IV facility.

All 118 trauma care facilities in Iowa are required to submit data to the state trauma registry. Both Level I and two of the four Level II facilities are verified as trauma care facilities by the American College of Surgeons (ACS). The remaining hospitals in Iowa are verified as trauma care facilities by the Iowa Department of Public Health and the Iowa Trauma Survey Team. The trauma survey team is a group of health care providers contracted by IDPH to assist in verifying trauma care facilities' compliance with trauma criteria. This group of health care providers is made up of trauma surgeons, emergency medicine physicians and trauma nurses from across the State. The trauma survey team uses the criteria adopted in Iowa Administrative Code 641 Chapter 134-Trauma Care Facility Categorization and Verification to assess the hospitals.

Count of Incidents by Trauma Facility Level

Source: Iowa Trauma Registry (1/1/2016 - 12/31/2016)

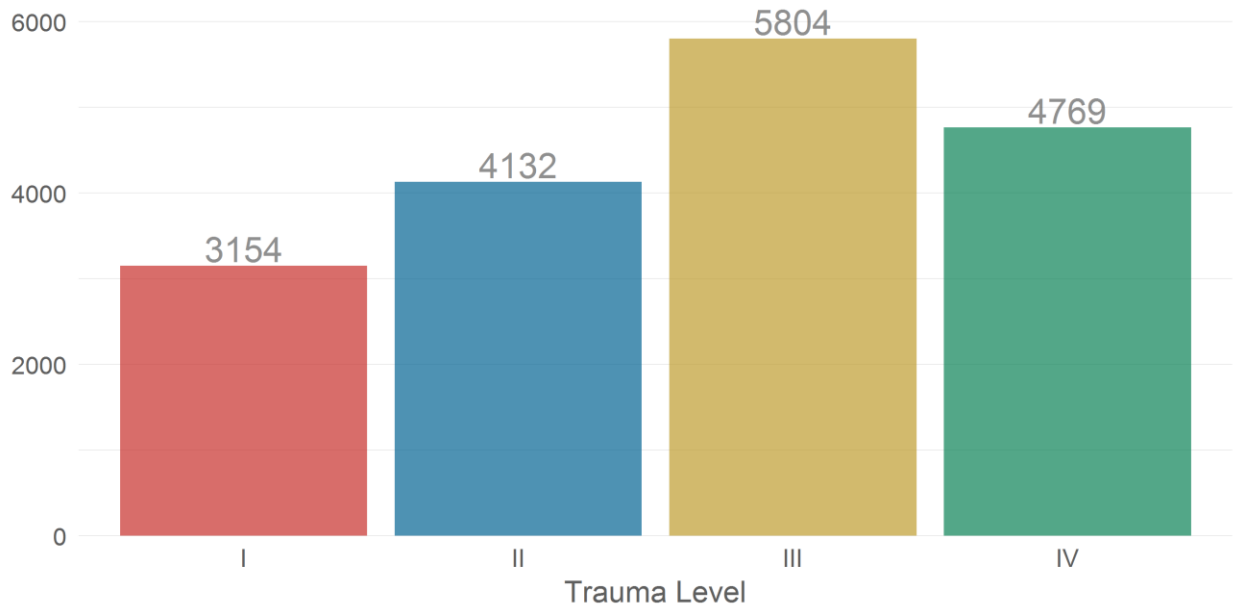


Figure 3: The number of trauma patients reported through the State Trauma Registry by facility level in 2016.

All Iowa hospitals have a requirement to submit data, but many had lost the capability due to antiquated software that was not compatible with the hospital systems. The Iowa Department of Public Health transitioned the Trauma Registry to a new vendor in 2015. Department staff provided training in multiple locations across the state. This has resulted in more incidents being reported to the state trauma registry. In 2014, Level IV facilities reported 2,005 incidents as compared to 4,769 in 2016. All level I, II and III facilities reported data for patients seen in 2016. Ninety-six percent of level IV facilities reported patients to the registry seen in 2016. The Department continues to support hospital data reporting and expects to have data from 100 percent of the facilities in 2018.

Response to Trauma

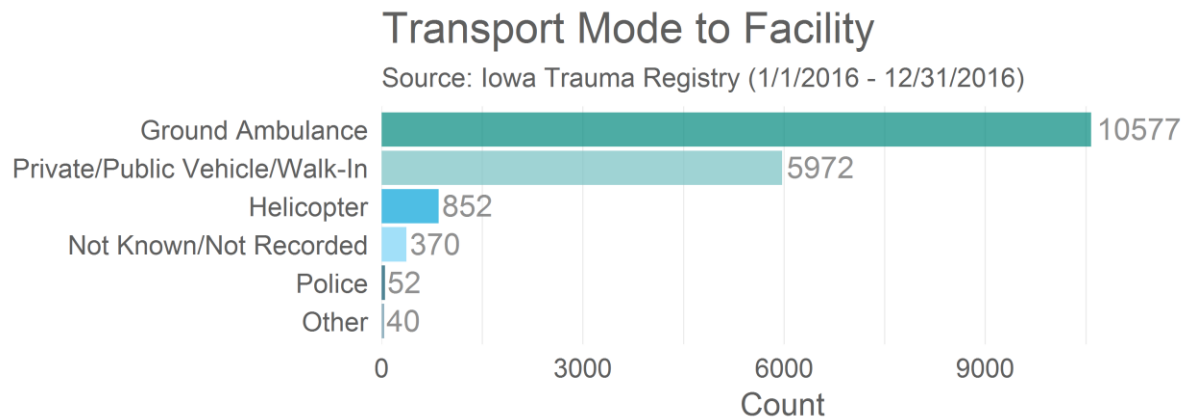


Figure 4: Method used to transport trauma patients to emergency care.

The data depicted in this table shows the mode or mechanism of transport of trauma patients for trauma care. Based on the Iowa Trauma Registry, 59 percent of patients were transported to the trauma care facility by ground ambulance, 33 percent of patients were transported by private/public vehicle/walk-in, 5 percent of patients were transported by helicopter, the mechanism for transport for 2 percent of the patients is unknown and less than 1 percent of trauma patients were transported by police or other.

Incident Count by ISS Range

Source: Iowa Trauma Registry (1/1/2016 - 12/31/2016)

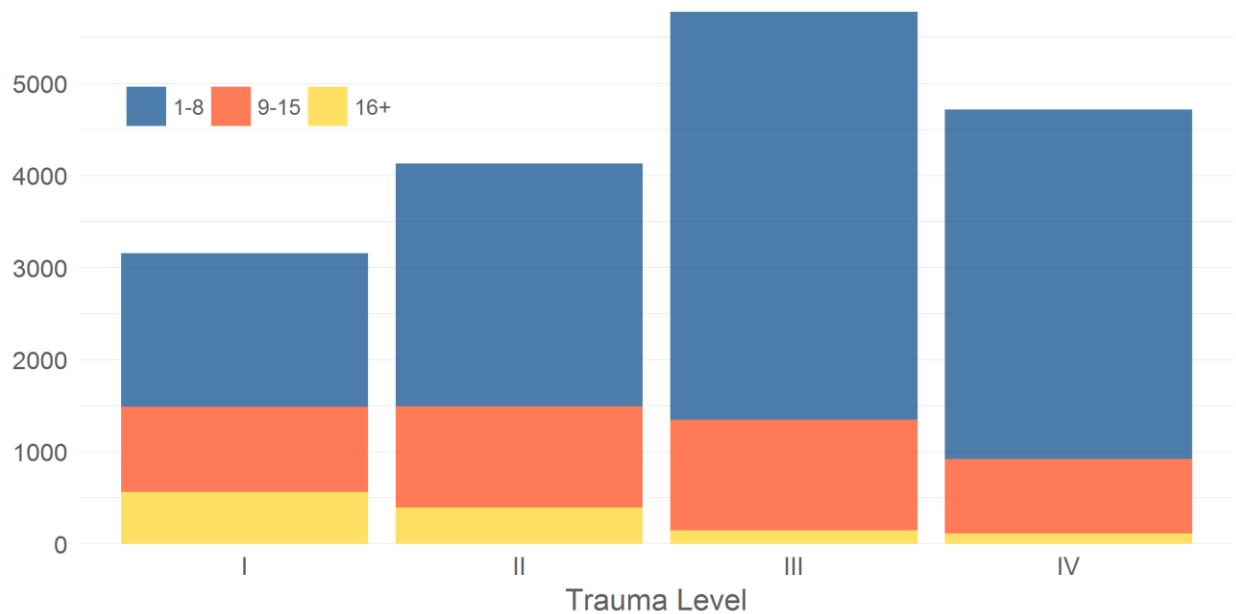


Figure 5: Incidents by trauma level within each Injury Severity Score (ISS) range.

The Injury Severity Score, or ISS, is used to rate the severity of the patient's injury. It correlates with mortality, morbidity and hospitalization time of patients after the injury. This score is based on the patient's injuries. ISS scores can range from 0 to 75. Any score greater than 15 is considered major trauma also known as polytrauma. A score of 1-8 is considered minor trauma, and scores between 9-15 are considered moderate trauma.

The data in the chart is from all hospitals, not just depicting data from hospitals that provided definitive care for the trauma patient. Level IV and some Level III facilities provide stabilization care for significantly injured trauma patients before transferring that patient to a higher level of care. The ISS score is retrospective and based on all the patient's injuries. The ISS ratings for patients seen at Level IV and Level III facilities is likely to be artificially low. The Level IV and Level III facilities may not identify all the patient's injuries, just the most critical injuries that require stabilization before transport. This impacts the ISS scores of patients seen at Level IV and Level III facilities.

Trauma registry data shows 47 percent of incidents at Level I facilities had an ISS over 8, and Level II facilities had 36 percent. Level III facilities were at 23 percent, and Level IV facilities had 19 percent with ISS over 8.

Cause of Injury Frequency

Source: Iowa Trauma Registry (1/1/2016 - 12/31/2016)

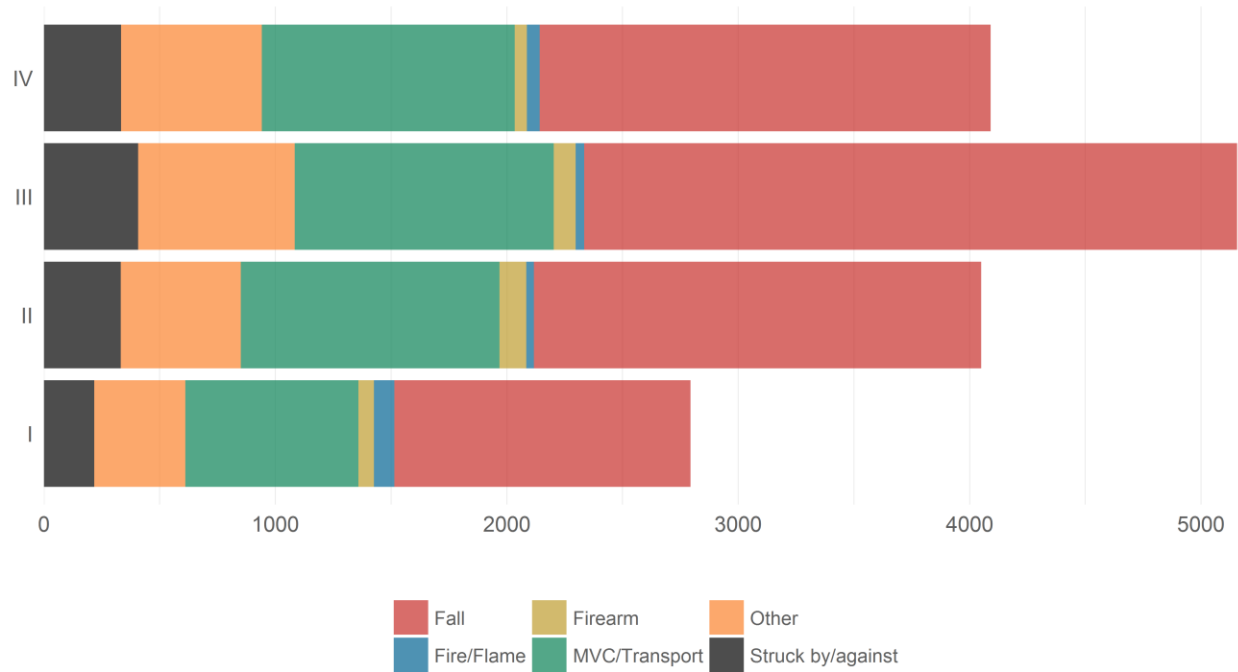


Figure 6

Level I facilities see a larger percentage of burn patients compared to all other levels. The State's only verified burn center is a Level I trauma care facility. Levels I and II trauma care facilities see a higher percentage of firearm injuries compared to Level III and IV facilities. The subcategories of the Other category in Figure 6 are expanded out to greater specificity in Figure 7.

Cause of Injury Frequency

Source: Iowa Trauma Registry (1/1/2016 - 12/31/2016)

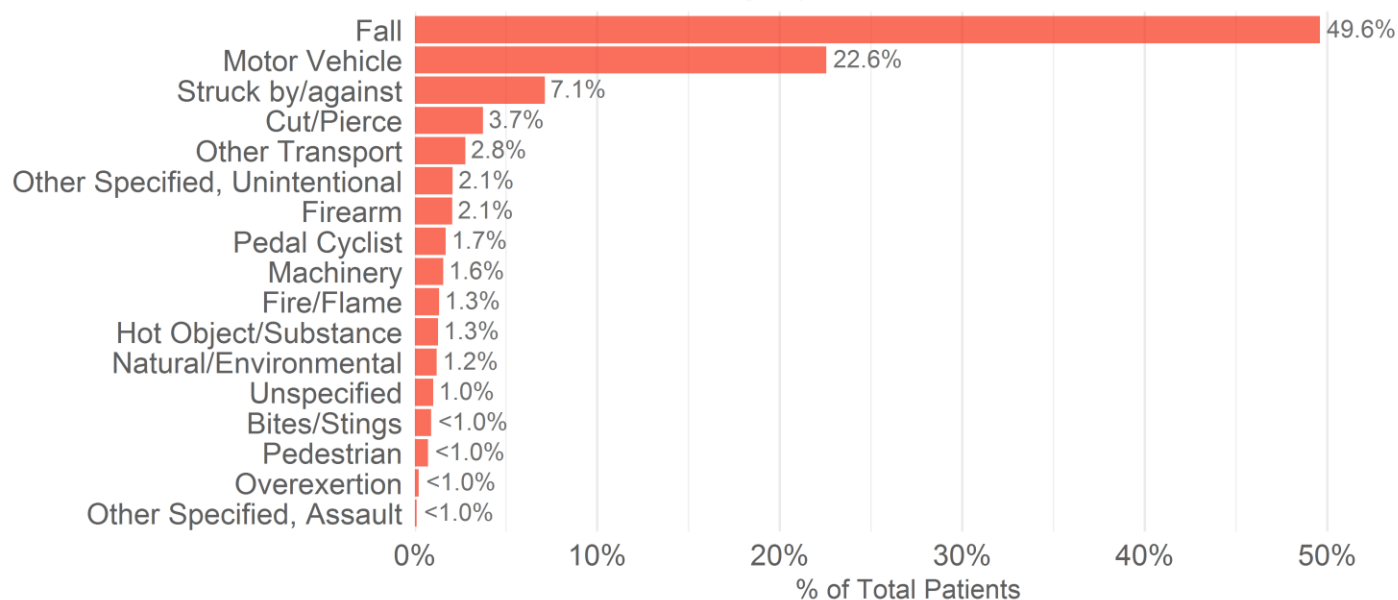


Figure 7

Falls account for approximately half of the registry's incidents. Since the registry does not include isolated hip fractures due to same-level falls, this percentage is significantly lower than the nearly 70 percent in Figure 9 which uses the Iowa Hospital Association's Inpatient and Outpatient Data Registry.

Hospital Admissions

The admissions data are obtained from the Iowa Hospital Association's Inpatient and Outpatient Data Registry. A trauma injury must be either the admitting or principal diagnosis to be included in this data set. A trauma injury has a diagnosis code that falls within the ICD-10 ranges shown starting on page 10 of the Iowa Trauma Patient Data Dictionary

(<https://idph.iowa.gov/Portals/1/userfiles/43/Trauma%20Registry%20Data%20Dictionary%20Jan%202017.pdf>). Based on these criteria, there were 12,507 patients with a trauma diagnosis code as the admitting or principal diagnosis code for first-hospital admissions at Iowa facilities.

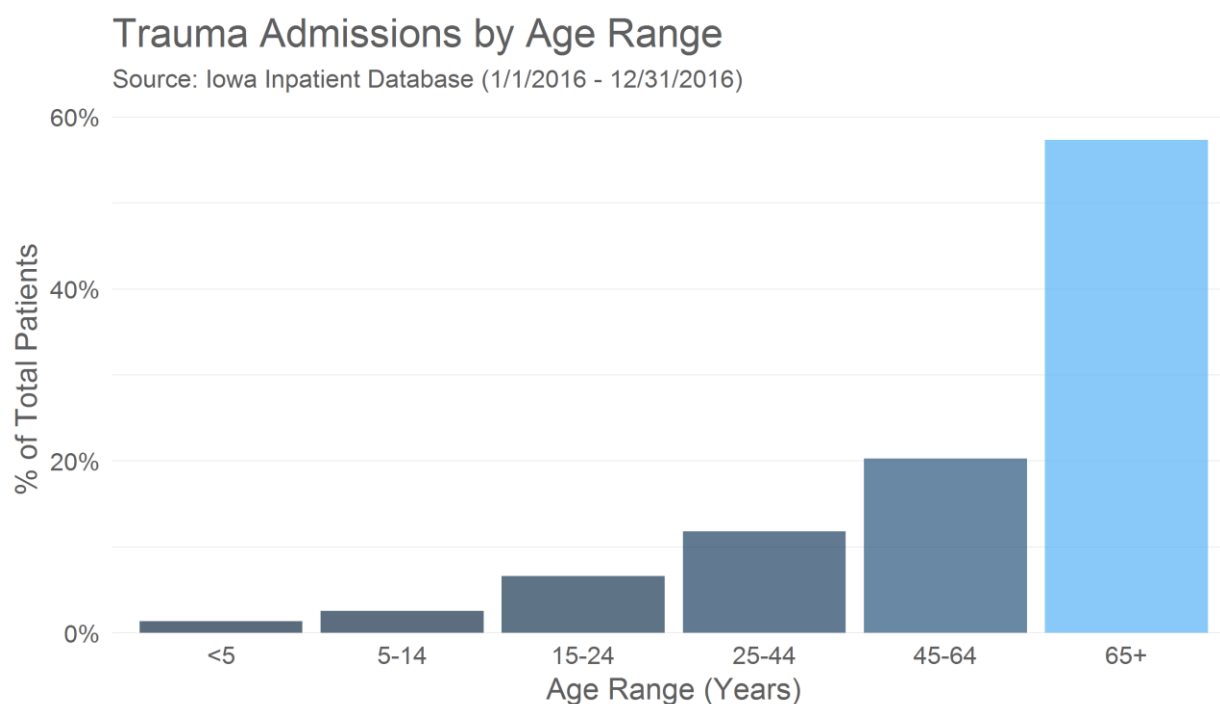


Figure 8

Patients 65 and older accounted for over half of all trauma admissions. Note that the age ranges are not of equal length; there are 5-, 10-, and 20-year ranges, as well as the open-ended 65+ range. Since the inpatient database does not exclude isolated hip fractures due to same-level falls like the state trauma registry, there are likely more patients in the 65+ range.

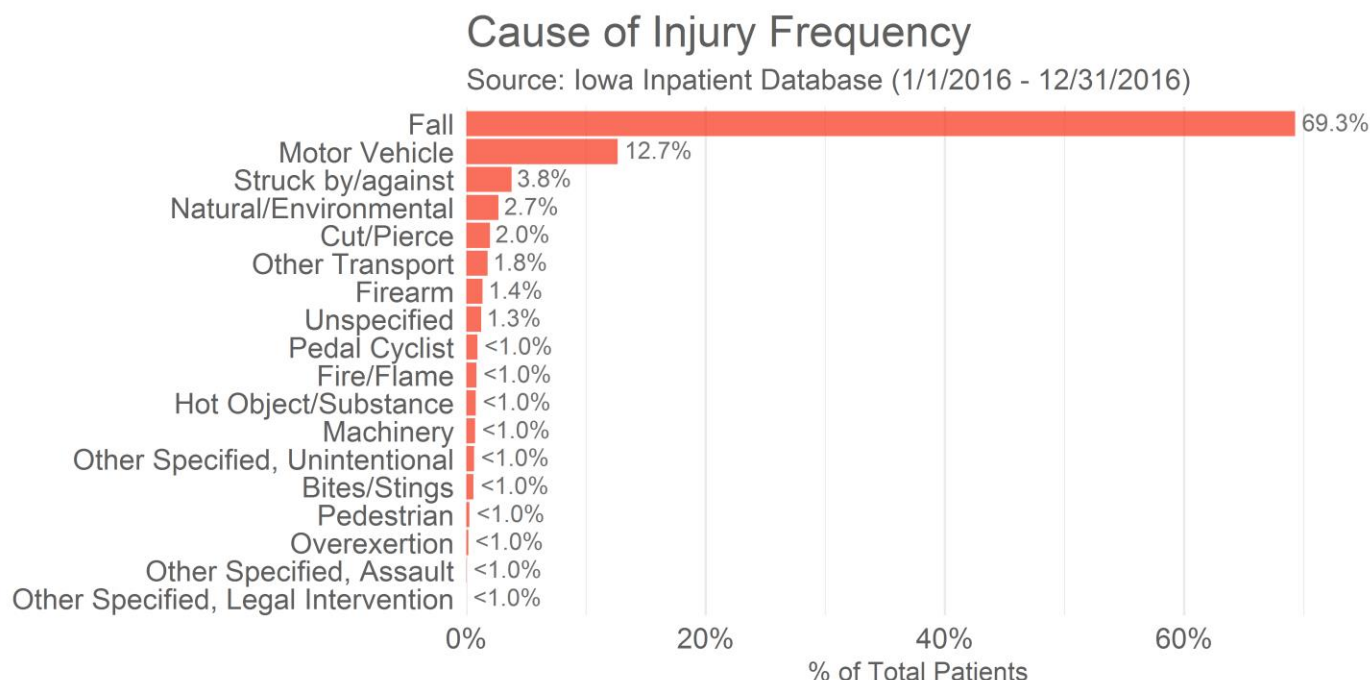


Figure 9

Since the inpatient database tracks all hospital admissions, same-level falls resulting in isolated hip fractures are included, so a greater percentage of trauma injuries are falls when compared to the state trauma registry. The IDPH trauma registry also requires facilities to enter all incidents for which a trauma team was activated, and a portion of those patients would not be included in the Inpatient and Outpatient Data Registry if not admitted to the hospital. The differences in inclusion criteria explain why the cause of injury percentages are different from Figure 7 to Figure 9.

Irrespective of the data source, the information is consistent. Falls and motor vehicle collisions are the most frequent causes of traumatic injury in Iowa.

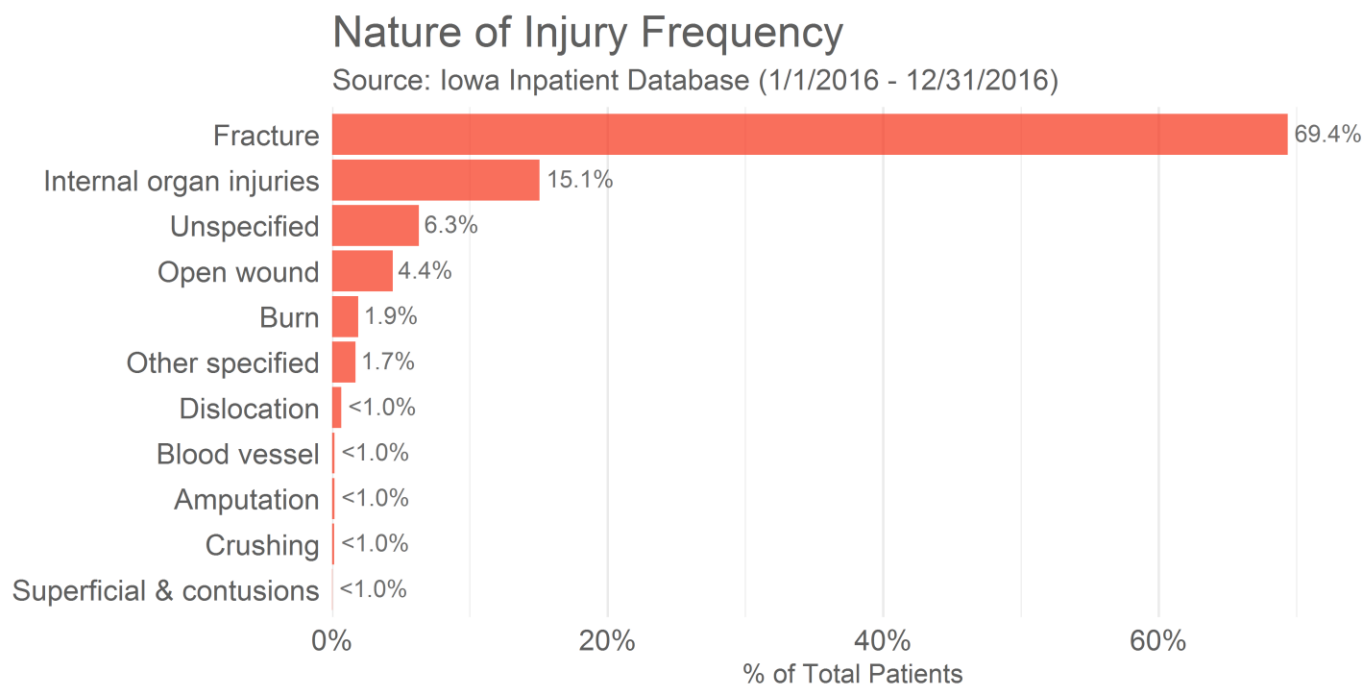


Figure 10

Fractures are by far the most common primary causes of trauma injuries that result in hospital admissions. The nature of injury is determined from the ICD-10 diagnosis code. The migration from using ICD-9 coding to ICD-10 in October 2015 hinders the direct comparison of categories derived from ICD codes.

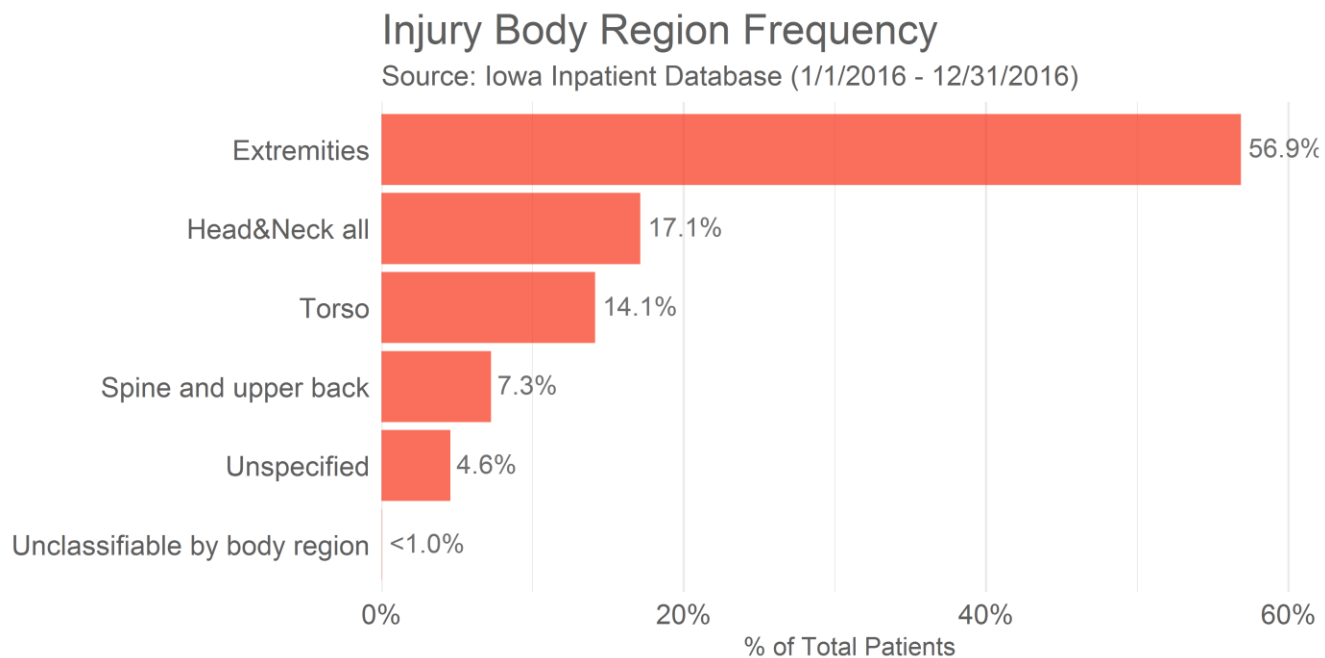


Figure 11

The body region is also derived from the ICD-10 diagnosis code. Most primary diagnosis codes for trauma injuries are for the extremities, and fewer than 5 percent of body regions were unspecified or unclassifiable.

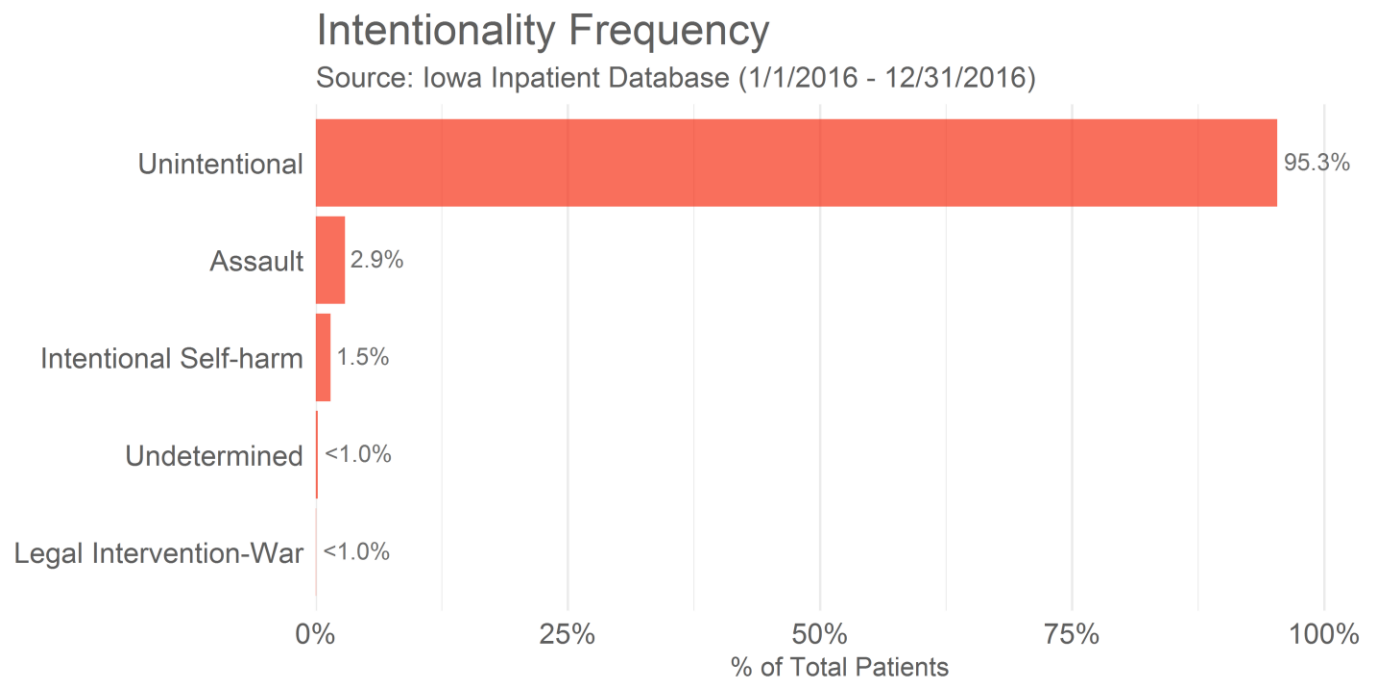


Figure 12

Fewer than 5 percent of traumatic injuries were deliberate. Injury intentionality is associated with the ICD-10 cause of injury code. This association can be found in the accompanying cause of injury matrix. Again, due to the difficulties of comparing dissimilar categories from ICD-9 to ICD-10, these 2016 numbers will be used as the new baseline against which to compare future results.

Deaths

Death data was compiled from publicly available reports from the Iowa Bureau of Health Statistics (see Iowa Death Certificate Data in Data Sources) and the Centers for Disease Control and Prevention (CDC) Underlying Cause of Death report tool (see Centers for Disease Control and Prevention in Data Sources).

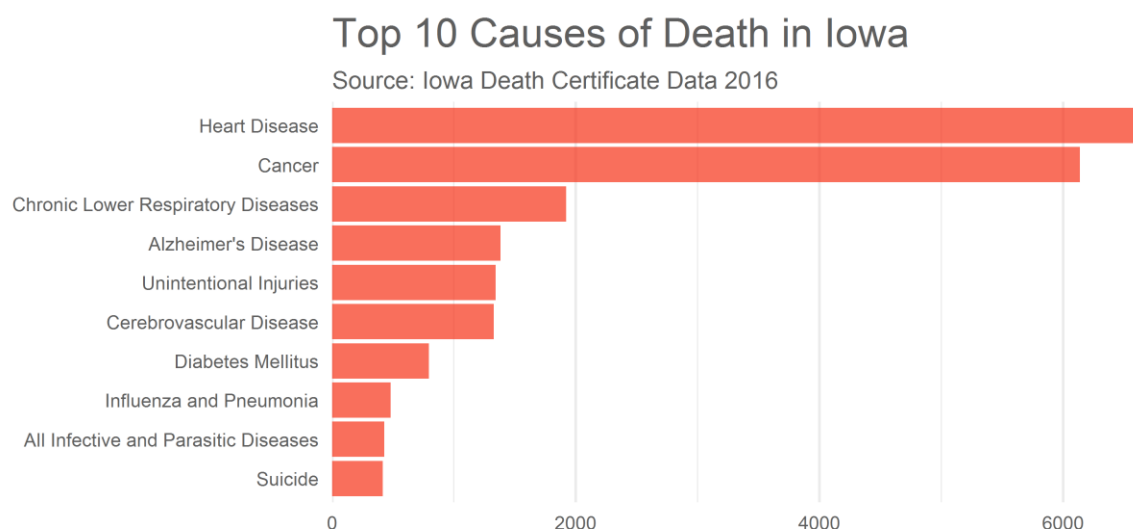


Figure 13

Unintentional injuries account for most trauma deaths in Iowa for 2016. The suicide category of this figure also includes trauma injuries. According to the CDC, injury is the leading cause of death among persons 1-44 years of age.

(https://www.cdc.gov/injury/wisqars/overview/key_data.html).

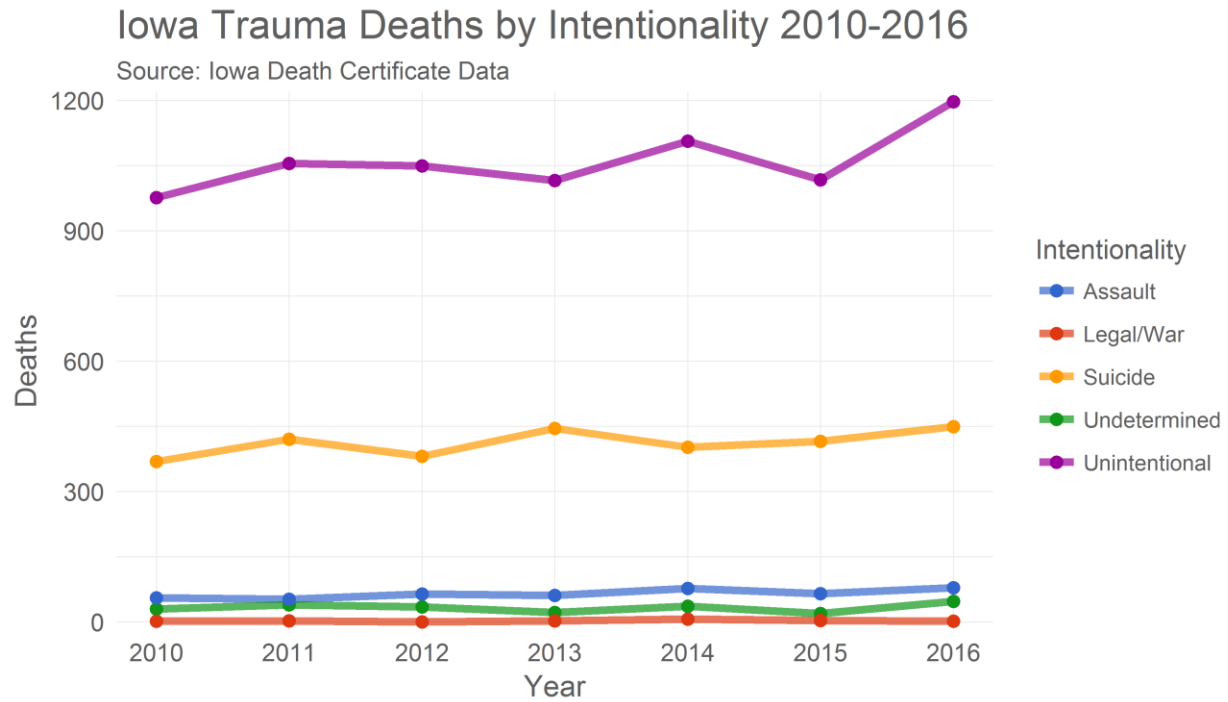


Figure 14: Historical data on trauma deaths categorized by intentionality.

The most dramatic change in Figure 14 is the increase of unintentional injury deaths from 2015 to 2016. Furthermore, all categories of intentionality increased from 2015 to 2016 except for Legal/War which accounts for an extremely small number of deaths. To investigate why unintentional injuries accounted for 180 more deaths in 2016 than 2015, Figure 15 breaks down unintentional injury deaths by cause of injury.

Iowa Unintentional Trauma Deaths by Cause 2010-2016

Source: Iowa Death Certificate Data

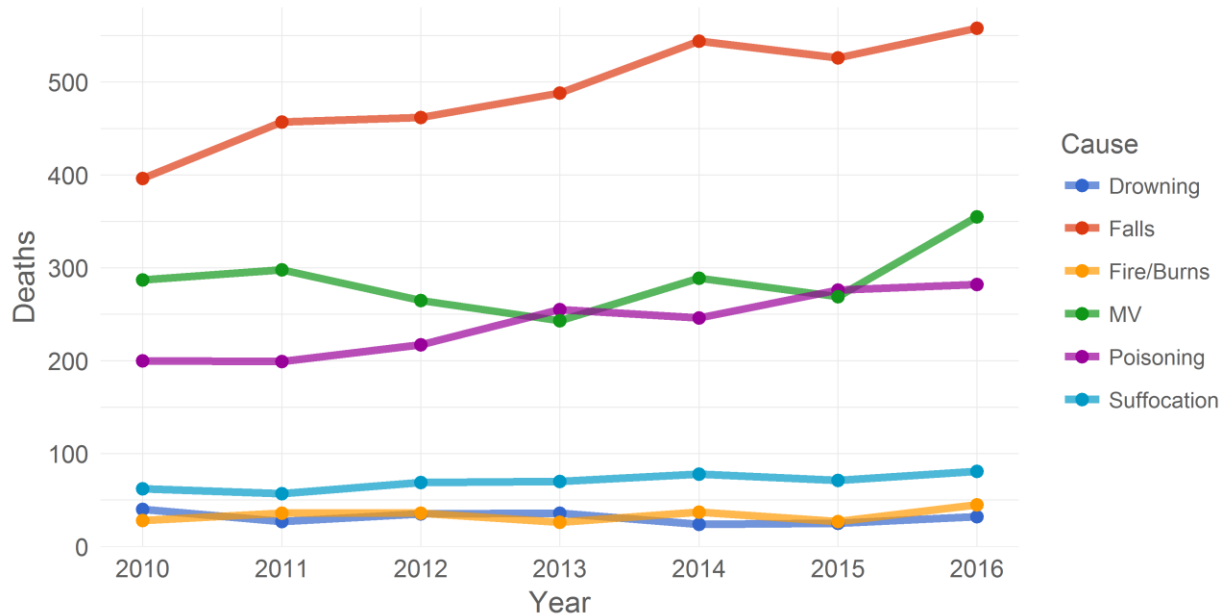


Figure 15

All six causes of unintentional injury in Figure 15 saw increases from 2015 to 2016. The largest increase was motor vehicle deaths which saw 86 more deaths in 2016. Unintentional falls resulting in death increased by 32. While these two causes of injury had the greatest increase in number of deaths, the combined increases of all categories are responsible for the dramatic increase in total unintentional injury deaths from 2015 to 2016 seen in Figure 14.

Iowa Trauma Suicides by Cause 2010-2016

Source: Iowa Death Certificate Data

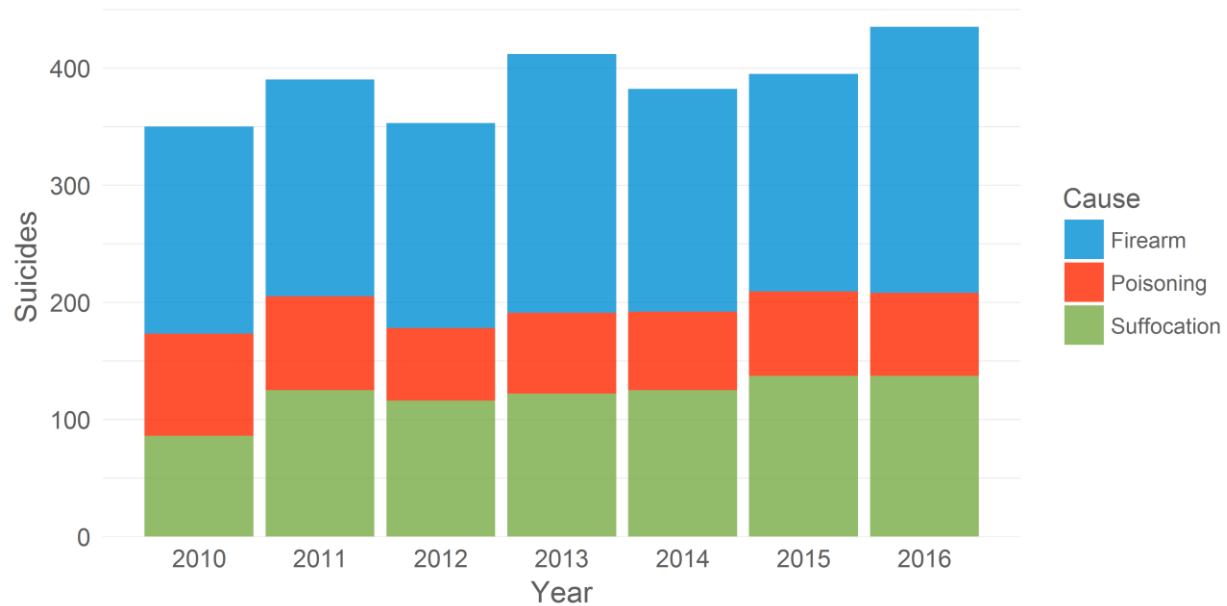


Figure 16: Historical death certificate data for 3 causes of suicide in Iowa.

From 2015 to 2016, firearm suicides notably increased. From 2010 to 2016, poisoning suicides have decreased as both a percentage of suicides and in terms of real numbers. 2010 had a low number of suffocation suicides, but since then, suffocations have stagnated in terms of percentage of suicides.

Trends in Trauma Deaths			
Cause	5-Year Average	2016 Deaths	% Above Average
Drowning	33	40	16.5%
Fall	500	561	10.9%
Fire/Flame	36	48	25.4%
MV Traffic	276	359	23.1%
Poisoning	329	378	13.0%
Suffocation	167	176	5.2%

The above table shows the deaths from the six given categories, regardless of intentionality. All six categories have more deaths in 2016 than the five-year average from 2011 to 2015. Two categories, Fire/Flame and MV Traffic, saw over 20 percent more deaths in 2016 compared to the previous five-year average, and MV Traffic accounted for 83 deaths higher than the average.

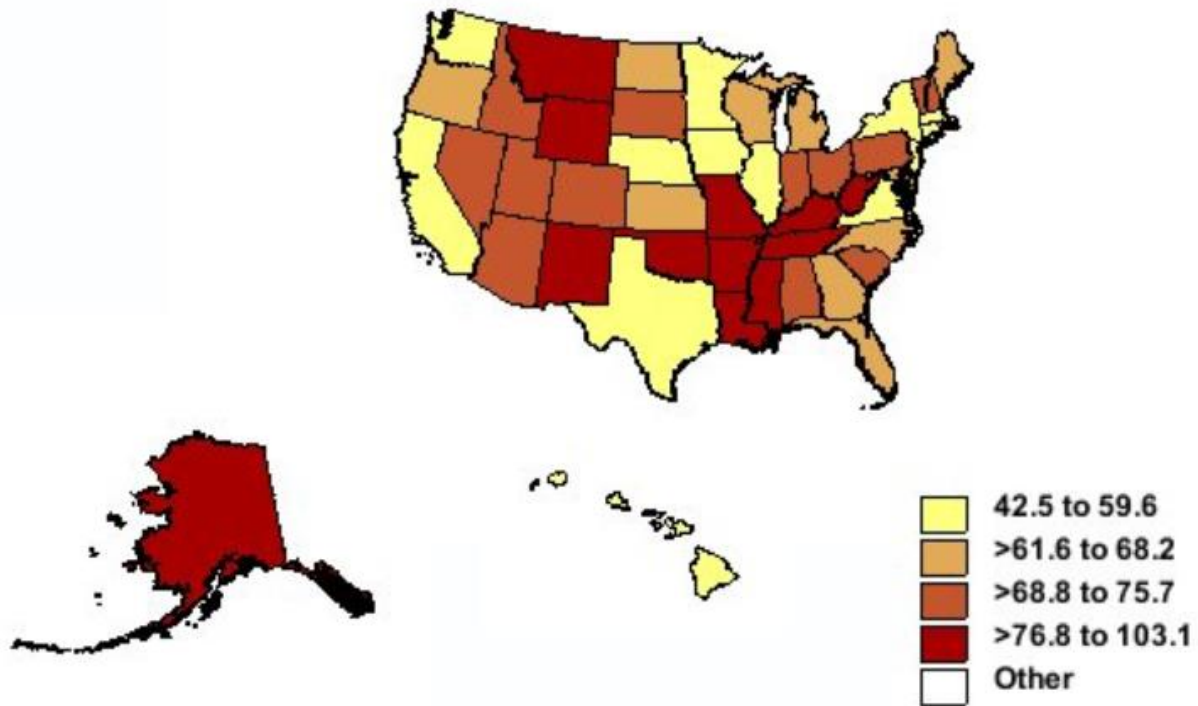


Figure 17: Age-adjusted U.S. death rates (CDC), 2012-2016.

Iowa is in the lowest tier of age-adjusted injury mortality out of the four tiers provided by the CDC. This contrasts with many other rural states and may be attributed to Iowa's uniquely inclusive trauma system. Age-adjusted mortality factors in the risk of death with respect to age (i.e. adjusting for increased risk of death in infants and the elderly), so these CDC figures will show the death rate compared to what would be the expected death rate based on the age of the residents. The numbers provided in the legends are per 100,000 people.

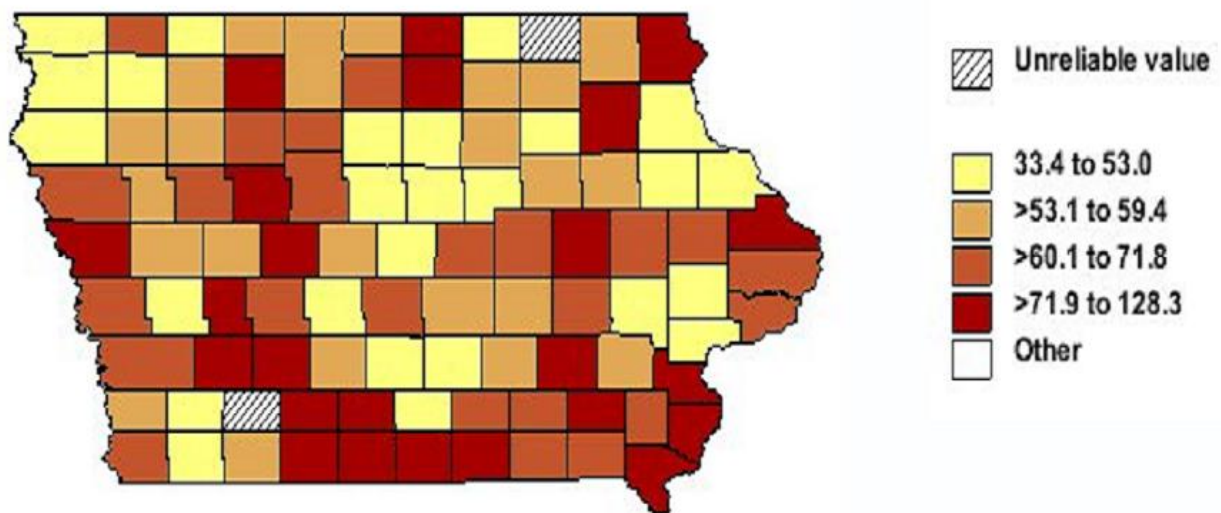


Figure 18: County age-adjusted death rates in Iowa (CDC), 2012-2016.

The counties of Iowa differ greatly in their respective age-adjusted death rates. Of the 25 percent highest age-adjusted death rate counties in Iowa, only one had a rate population density greater than 100 people per square mile (Des Moines County at 101.8 people per square mile and an age-adjusted injury mortality rate of 79 per 100,000 people).

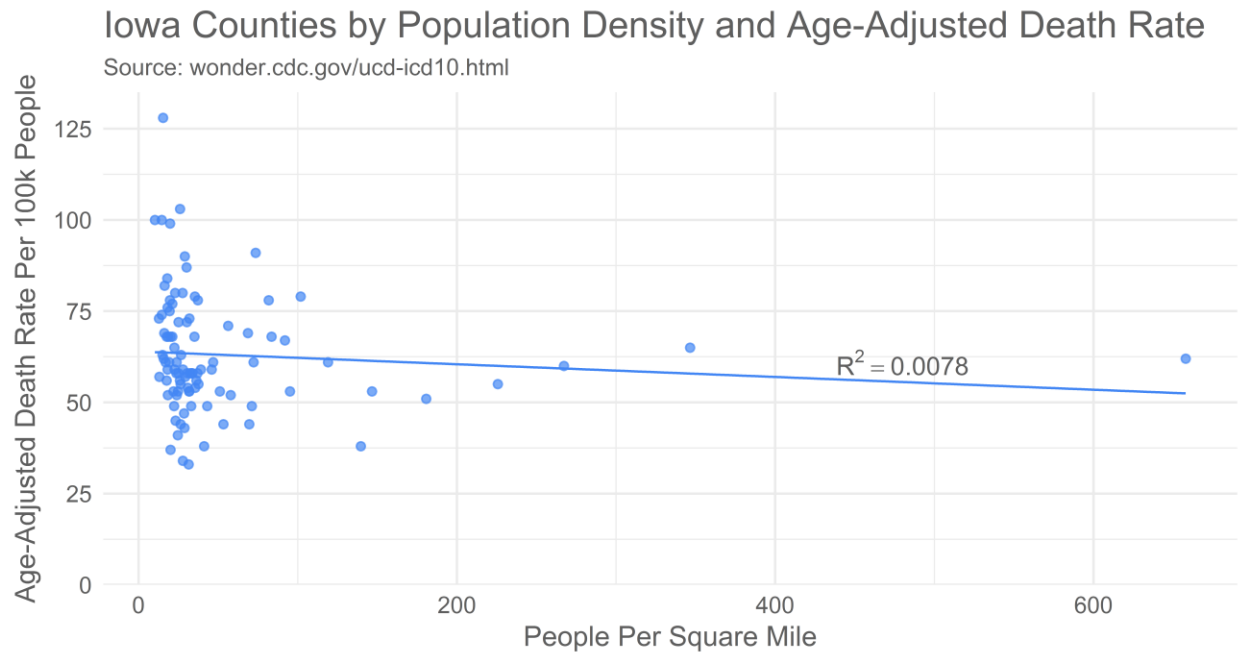


Figure 19: Scatterplot of 97 Iowa counties by age-adjusted injury mortality rate and population density. Each circle represents a county. Two counties did not have enough qualifying deaths to be shown.

Figure 19 demonstrates the relationship between population density and the age-adjusted injury mortality rate for qualifying Iowa counties as provided by the CDC. Some of the outlying counties have been labeled. As represented by R^2 , the coefficient of determination, only 0.78 percent of the variance in the age-adjusted injury mortality rate can be explained by the population density of the respective county. Removing the outliers increases R^2 by less than 2 percent. This indicates that the age-adjusted injury mortality rate is not strongly tied to population density in a given county. The more densely-populated counties tend to be somewhat close to the average rate.

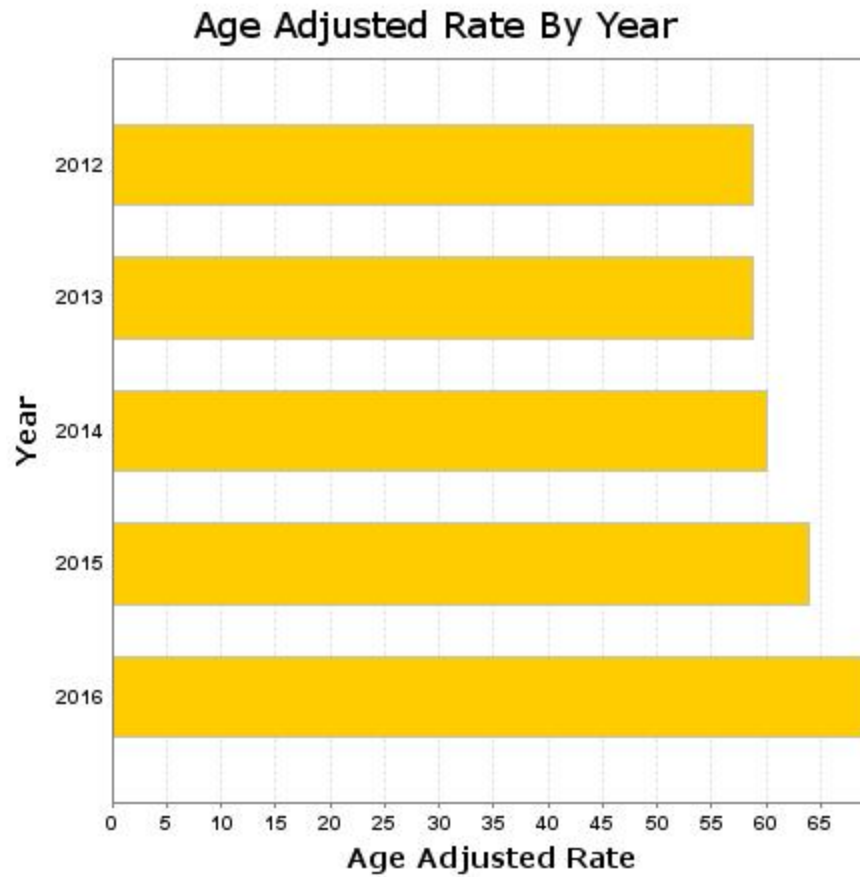


Figure 20: Age-adjusted injury mortality rates for 2012-2016 in the United States (CDC).

On a national scale, the age-adjusted injury mortality rate spiked in 2016 even after the large increase from 2014 to 2015. This increase in 2016 is also seen in Iowa, as can be seen in Figure 21.

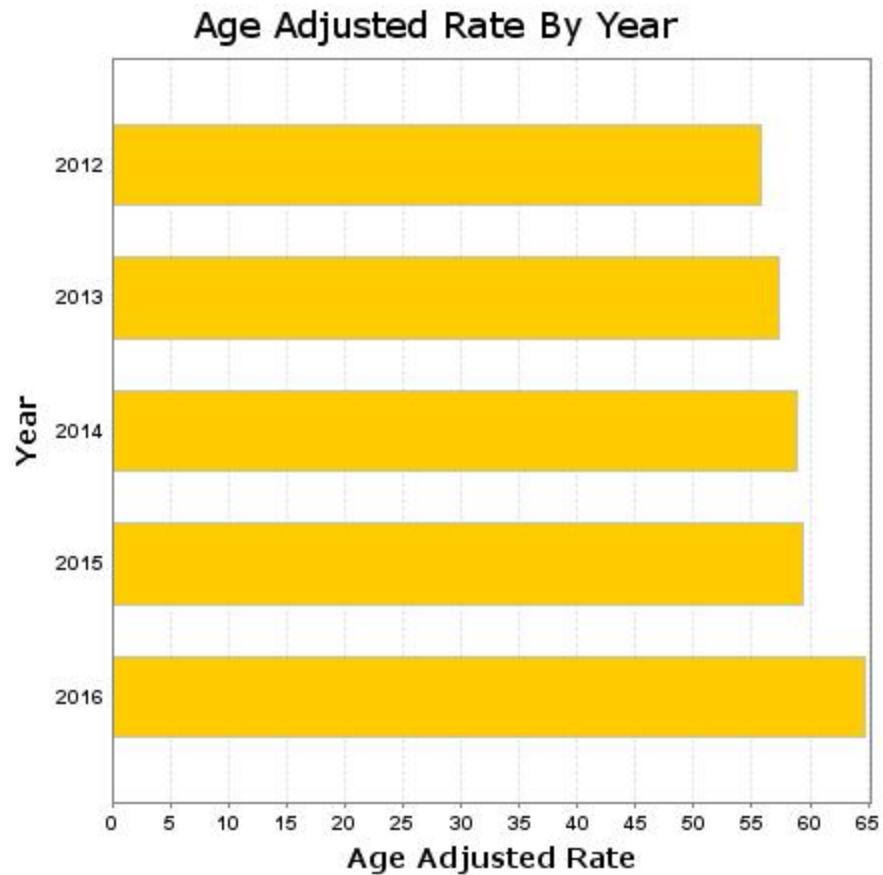


Figure 21: Age-adjusted injury mortality rates for 2012-2016 in Iowa (CDC).

The age-adjusted injury mortality rate has increased over time in Iowa, with a noticeable jump in 2016 to 64.7 per 100,000 people. This remains consistently below the national trend, which reached 69.0 per 100,000 people in 2016.

Performance Indicators

The System Evaluation and Quality Improvement Subcommittee (SEQIS) of the Trauma System Advisory Council (TSAC) established a set of indicators to measure the trends in performance of the statewide trauma system. In order to calculate these indicators, data is extracted from the state trauma registry, processed according to the accompanying Hospital System State Indicators document (Attachment 1), and distributed to all reporting facilities. Using these indicators, trauma programs are able to see their own performance compared to other hospitals of the same level, as well as compared to the state as a whole. Below are the indicator results for the state in the far right column, as well as divided up by trauma facility level (with levels I and II combined).

Trauma indicator data is provided to all Iowa hospitals and trauma service areas on a quarterly basis. The data is used to drive performance improvement processes and prevention programs. The quarterly data reports assist hospitals and service areas in monitoring changes within the trauma system.

Indicators Calculated For January 1, 2016 To December 31, 2016	Level I & II	Level III	Level IV	State	Goal
Indicator 1a - Trauma Surgeon Responding Within 15 Minutes	84.6%	64.8%	N/A	78.3%	80.0%
Indicator 1b - Trauma Surgeon Responding Within 30 Minutes	94.6%	90.1%	N/A	93.1%	80.0%
Indicator 1c - Trauma Surgeon Response Time Unknown	1.6%	8.7%	N/A	3.9%	0.0%
Indicator 1d - Physician Responding Within 5 Minutes	90.5%	54.1%	89.4%	74.1%	80.0%
Indicator 1e - Physician Responding Within 20 Minutes	96.8%	86.3%	97.3%	92.2%	100.0%
Indicator 1f - Physician Response Time Unknown	2.0%	5.0%	8.0%	4.4%	0.0%
Indicator 2 - Injury Time Blank	14.0%	15.3%	6.8%	12.6%	0.0%
Indicator 3 - Probability of Survival Calculated	70.8%	78.0%	62.2%	71.0%	100.0%
Indicator 4a - Deceased Trauma Patient Autopsied	26.0%	26.4%	44.6%	30.1%	
Indicator 4b - No Autopsy On Death With LOS Greater Than 72 Hours	97.3%	100.0%	100.0%	98.6%	
Indicator 5a - Blood ETOH Measured	42.9%	19.6%	16.6%	28.4%	75.0%
Indicator 5b - Blood ETOH Positive	32.7%	48.6%	46.8%	38.5%	
Indicator 6a - 1st Hospital Initial GCS Less Than 9 With No Head CT Before Transfer To Definitive Care	N/A	54.1%	73.9%	64.6%	100.0%

Indicator 6b - 1st Hospital Initial GCS Less Than 9 And Arrived To Definitive Care Over 3 Hours From Injury	25.0%	3.8%	0.0%	20.4%	0.0%
Indicator 7 - Patients To Definitive Care Greater Than 3 Hours	39.5%	18.1%	16.6%	28.8%	0.0%
Indicator 8 - Survival Rate For All Traumas	95.3%	98.4%	98.4%	97.1%	
Survival Rate For Low Risk Traumas	98.5%	99.0%	98.9%	98.8%	
Survival Rate For Moderate Risk Traumas	86.6%	85.0%	84.1%	86.3%	
Survival Rate For High Risk Traumas	33.8%	19.2%	54.5%	34.1%	
Other Indicator 1 - Incidents Submitted Within 60 Days Of Patient Discharge	45.8%	64.1%	58.1%	55.0%	80.0%
Other Indicator 2 - Incidents With Validity Score Greater Than 84	58.3%	97.7%	92.6%	80.2%	90.0%

Attachment 1

Hospital System State Indicators

Details regarding the calculation of the indicators are described below.

- Indicator 1a – Trauma surgeon present in ED within 15 minutes. of patient arrival
 - For level 1 trauma activations, how often did the first responding trauma surgeon arrive within 15 minutes of the arrival of the patient.
 - Trauma surgeons are defined as trauma team members who have 'Surgery/Trauma' selected for the Trauma Team Member Service Type on the incident form.
 - The response time is calculated as the minutes from the ED/Acute Care Admission Time to the Trauma Team Member Arrived Time.
 - 15 minutes is the indicator for Level I and II facilities.
 - This indicator disregards incidents for which there was no calculable response time for a 'Surgery/Trauma' trauma team member.
- Indicator 1b – Trauma surgeon present in ED within 30 minutes. of patient arrival
 - Calculated the same as 1a, but 30 minutes is the indicator for Level III facilities.
- Indicator 1c – Trauma surgeon response time unknown
 - For level 1 trauma activations, how often are we unable to calculate the response time of the trauma surgeon.
 - If we are unable to calculate the response time, that means that the we are missing at least one of ED/Acute Care Admission Date/Time or Trauma Team Member Arrived Date/Time.
- Indicator 1d – 1st physician (Trauma surgeon or ED physician) present in ED within 5 minutes. of patient arrival
 - For level 1 and 2 trauma activations, how often did the first responding physician arrive within 5 minutes of the arrival of the patient.
 - Physicians are defined as trauma team members who have 'Surgery/Trauma' or 'Emergency Medicine' selected for the Trauma Team Member Service Type on the incident form.
 - The response time is calculated as the minutes from the ED/Acute Care Admission Time to the Trauma Team Member Arrived Time.
 - 5 minutes is the indicator for Level I and II facilities.
 - This indicator disregards incidents for which there was no calculable response time for a 'Surgery/Trauma' or 'Emergency Medicine' trauma team member.
- Indicator 1e – 1st physician (Trauma surgeon or ED physician) present in ED within 20 minutes. of patient arrival
 - Calculated the same as 1d, but 20 minutes is the indicator for Level III and IV facilities.
- Indicator 1f – Physician response time unknown

- For level 1 and 2 trauma activations, how often are we unable to calculate the response time of the physician.
 - If we are unable to calculate the response time, that means that the we are missing at least one of ED/Acute Care Admission Date/Time or Trauma Team Member Arrived Date/Time.
- Indicator 2 – Missing injury time
 - Calculated as the number of incidents with a missing injury time divided by the total number of incidents for the period.
- Indicator 3 – Trauma patient had a Probability of Survival (Ps) score calculated
 - Calculated as the number of incidents with a valid Probability of Survival score divided by the total number of incidents for the period.
 - Probability of Survival is calculated using the following factors:
 - Injury Severity Score (ISS): Derived from the AIS codes associated with the diagnosis codes.
 - Revised Trauma Score (RTS): Derived from Glasgow Come Scale, systolic blood pressure, and respiratory rate.
 - Patient age.
 - Trauma type: Derived from the injury code (found on the Injury tab in ImageTrend) and its associated trauma type.
 - If any of those factors are missing, the Probability of Survival score will not be calculated.
- Indicator 4a – Deceased trauma patient was autopsied
 - Calculated as the number of incidents with a 'Yes' value for Autopsy divided by the number of incidents with a value of 'Deceased/Expired' for either ED/Acute Care Disposition or Hospital Discharge Disposition.
- Indicator 4b – No autopsy done on death with stay greater than 72 hours
 - Calculated as the number of deceased patients who were at the facility for over 72 hours and did not have an autopsy performed divided by all deceased patients who were at the facility for over 72 hours.
- Indicator 5a – Blood ETOH was measured
 - Calculated as the number of patients who had blood ETOH measured divided by all patients.
 - This does not exclude any patients, so pediatric patients are included.
- Indicator 5b – Blood ETOH was positive
 - Calculated as the number of patients who had a positive blood ETOH divided by the number of patients who had blood ETOH measured.
- Indicator 6a – 1st hospital initial GCS < 9 with no head CT done before transfer to definitive care
 - Calculated as the number of patients with a GCS less than 9 at the first hospital who did not have a head CT prior to transfer divided by the number of patients with a GCS less than 9 at the first hospital who were transferred.
 - The numbers for your hospital are only for patients who were not transferred out of your facility, so this indicator for your facility is for patients who received

definitive care at your facility.

- Indicator 6b – 1st hospital initial GCS < 9 arrived to definitive care > 3 hours in transferred patients
 - Calculated as the number of patients with a GCS less than 9 at the first hospital who arrived to definitive care over 3 hours from injury time divided by the number of patients with a GCS less than 9 who were transferred.
- Indicator 7 – SEQIC population that arrived to definitive care in > 3 hours from injury time
 - Calculated as the number of patients who took more than 3 hours to arrive at the definitive care facility from injury time divided by all patients.
 - Definitive care is determined the same as in 6a, i.e. patient is not transferred out.
- Indicator 8 – Survival rate by risk for death (high, moderate, and low) stratified by trauma hospital level
 - The definitions for risk levels are as follows (Abnormal Physiology thresholds also listed):
 - Abnormal Physiology
 - GCS 3-5
 - Respiration <5 or >30 respirations per minute
 - Systolic Blood Pressure <60 mm Hg
 - Risk Definitions
 - High
 - Probability of Survival <2 **OR**
 - ISS >41 **OR**
 - ISS >24 if Abnormal Physiology
 - Moderate
 - Probability of Survival 0.2-<0.5 **OR**
 - ISS 16-41
 - Low
 - Probability of Survival 0.5-1.0 **OR**
 - ISS <16 **OR**
 - Normal range physiology
 - All survival rates are calculated as the number of patients who do not have an ED/Acute Care Disposition or Hospital Discharge Disposition of 'Deceased/Expired' divided by all patients.
 - Other Indicator 1 – Incident submitted within 60 days of patient discharge
 - Calculated as the number of incidents entered in the trauma registry within 60 days of patient discharge divided by the number of all incidents.

- The data dictionary specifies that 80% of incidents should be entered within 60 days of patient discharge, and 100% of incidents should be entered within 120 days of patient discharge.
- The patient discharge date is the later of ED/Acute Care Admission Date and Hospital Discharge Date.
- Other Indicator 2 – Incident has validity score of 85% or greater
 - Calculated as the number of incidents with a validity score of 85% or greater divided by all incidents.

Data Sources

Centers for Disease Control and Prevention: Figures 15-18 were produced using the tool located here: <https://wonder.cdc.gov/ucd-icd10.html>.

IHA Inpatient and Outpatient Data Registry: These are patients who were admitted to a given facility. The incidents used for analysis were the patients whose admitting or principal diagnosis was a trauma diagnosis code based on our registry inclusion criteria. For patients seen at multiple facilities, the first hospital at which they were seen was used.

Iowa Death Certificate Data: The Bureau of Health Statistics publishes annual reports on the death certificate data collected by the state. The reports can be found here: <https://idph.iowa.gov/health-statistics/data>.

Iowa EMS Registry: This contains the EMS runs for the state of Iowa in 2016. During this year, the registry transitioned from www.iowafirebridge.com to www.imagetrendelite.com/Elite/?organizationId=iowa. Data is pulled from both sources to complete the year's data.

Iowa Trauma Registry: This is the trauma registry that hospitals are required to submit data to as defined by the inclusion criteria on page 10 of the Iowa Trauma Registry Data Dictionary (<https://idph.iowa.gov/Portals/1/userfiles/43/Trauma%20Registry%20Data%20Dictionary%20Jan%202017.pdf>). Note that some facilities track same-level falls resulting in isolated hip fractures, but it is not required. The information is collected on <https://patientregistry.imagetrend.com/iowa/>.